

# SEVERE ACUTE MATERNAL MORBIDITY; A REVIEW IN A TERTIARY CARE HOSPITAL

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**ABSTRACT...Objective:** To determine the frequency and pattern of severe obstetric morbidity and mortality. **Design:** Cross sectional study. **Period:** 1<sup>st</sup> Oct 2005 to 30<sup>th</sup> Sep 2007. **Setting:** Military Hospital Rawalpindi. **Methods:** Cases of severe acute maternal morbidity and maternal mortality were collected and comparisons made of disease profile, organ system dysfunction, parity, mode of delivery, whether incident occurred at home or in the hospital and also whether patient was booked or unbooked. **Results:** One hundred and ten cases of Severe Acute Maternal Mortality (SAMM) and eleven cases of maternal mortality were identified. More maternal deaths occurred in patients who had not booked themselves for antenatal care. The four most frequent cases of severe morbidity were: hypertension 36 (32%), haemorrhage 32 (29%), anemia 16 (14%), sepsis 12 (10%) in this order. The four causes of deaths were: sepsis 4 (36%), hypertension 4 (36%), amniotic fluid embolism 2 (18%), haemorrhage 01 (10%). There were statistically significant number of patients in mortality arm of sepsis group ( $p=0.01$ ) In patients with SAMM there was a higher percentage of patients undergoing caesarean sections in haemorrhage and hypertension arm compared to background rate of 35%. Multi organ failure, cerebral and respiratory system involvement was linked to both SAMM and morbidity. Maternal mortality index was highest for sepsis (25%), and lowest for haemorrhage (3%) with hypertension intermediate in position (10%). **Conclusions:** A review of Severe Acute Maternal Morbidity offers a non threatening stimulus for improving quality of care. Comparison of Severe acute maternal morbidity with maternal death gives a different disease pattern and shows that different factors operate in each condition. Therefore both reviews complement each other.

**Key words:** Severe acute maternal morbidity, Near-miss, Audit.

## INTRODUCTION

Maternal mortality is used internationally as a measure of quality of obstetric care despite its rarity in the developed world. This is exemplified by the UK confidential enquiry into maternal death which has gathered data and conducted multiprofessional case assessment over 50 years<sup>1</sup>. Over the past decade epidemiologists and clinicians feel that maternal mortality is too rare an event to serve as a marker of quality of services and / or clinical lessons.

Most previous studies have counted admissions into intensive care as a criterion for SAMM. The reported incidence varies from 0.05 to 1.09%. In the armed forces hospitals we have a system of putting severely ill patients on Very Severely Ill List (VSIL). This is then highlighted on patient's documents and bed so that patient receives extra care and senior consultant involvement in management. VSIL patients would thus serve as a database for our study. The study was conducted to assess if "near miss" could be used as a marker of an analyses of maternal deaths in order to describe severe maternal disease. The definition of SAMM used is as

described by Mantel et al<sup>2</sup> - A woman with organ system dysfunction or failure would usually die if inadequate or no treatment or support is given.

## METHODS

All patients in MH Rawalpindi during the study period between 1st Oct'2005 to 30th Sep 2007 on VSIL were reviewed prospectively if they fitted into definition of SAMM and were thereby included in the study. VSIL served as a platform for developing data base. Thus data on all cases of severe acute maternal morbidity and maternal mortality was collected on a performa and comparisons made of age, parity, primary disease profile, secondary organ system dysfunction/failure, mode of delivery, whether incident occurred at home or in the hospital and also whether patient was booked or unbooked.

We focused on morbidity associated specifically with pregnancy and for which management usually involves obstetric professionals. Cardiac cases were excluded as these are admitted in Armed Forces Institute of Cardiology (AFIC) a neighboring hospital. Some unusual

cases with Idiopathic thrombocytopenic purpura, anemia (aplastic, hemolytic), leukemia etc were included but the main focus was on obstetric conditions. The primary obstetric factor was taken as the factor that probably initiated the chain of events that led to SAMM. In addition the organ system failure or dysfunction was identified. This is important information with regard to identifying health care resources and skills needed to manage each case effectively.

A new index called the maternal mortality index was used. It is defined as the number of maternal deaths divided by the sum of women with SAMM and maternal deaths and expressed as a percentage. This gives an idea of what proportion of women with severe morbidity, as defined, will go on to demise. We used descriptive statistics and also compared by means of  $\chi^2$  test with statistical significance taken as  $p < 0.05$ .

## RESULTS

During the study period there were a total of 110 women with SAMM versus 11 maternal deaths.

Table I shows the total no of cases in the study disease wise. There were a total of 15757 deliveries so the incidence is 6.98/1000 for SAMM. There were 2 cases of amniotic fluid embolism one supported by fetal squames in bronchial washings and the 2nd by strong clinical background of sudden collapse following ARM followed by coagulopathy. These were not analyzed any further. Cases with anemia were those with Haemoglobin less than 4gm/dl. Due to the fact that MH was in close proximity to Armed Forces Institute of Transfusion (AFIT) we got referrals from peripheral hospitals with various kinds of anemia including hemolytic, aplastic etc. These patients were put on VSIL transiently and were built up before delivery. Again these and other medical disorders did not need any further discussion.

Table II compares the demographic features of the two groups and shows that percentage of unbooked patients was more in the mortality arm.

Table III shows the complications in hypertensive cases. There were equal number of cases with HELLP syndrome and Eclampsia. There were 4 mortalities in this

group. One case of HELLP syndrome had liver rupture and intractable coagulopathy. Even recombinant factor VII was tried but she died after 3rd laparotomy despite obstetric hysterectomy, internal iliac artery ligation and liver repair and packing. One case of eclampsia died due to intracranial haemorrhage. Mortality index for hypertensive disorders was 10 %.

Organ system dysfunction in hypertensive disorders are shown in Table IV. Morality index was 100% in those with multiple organ failure. It was also high in those with respiratory or cerebral dysfunction.

Coming on to Haemorrhage (Table V), there were 13 cases of placenta praevia / accreta topping the list. There was one mortality in a case of accreta following hysterectomy despite senior staff involvement. Overall the mortality index for haemorrhage was 3%.

Table VI shows the operative interventions performed in 13 cases of haemorrhage .Obstetric hysterectomy is an important marker of severe morbidity. Incidence in our study was 0.57/1000 deliveries for haemorrhage alone. There were 2 more hysterectomies, but the patients were classified separately one for rupture and 1 for HELLP syndrome not included here to avoid duplication of results. Therefore overall obstetric hysterectomy rate was 0.68/1000 deliveries.

Risk factors for haemorrhage are shown in table VII .The most frequent factor was previous caesarean section and placenta praevia /accreta . Prolonged labour and grand multiparity were not as frequent as the former.

As expected there were significantly more women who did not have any antenatal care in the mortality arm .In both cases of mortality with eclampsia this was a causative factor and also in all cases of septic abortion who died .Though significantly more percentage of patients in mortality arm were unbooked the difference did not reach statistical significance due to small number in mortality arm. We excluded thromboembolism as it is often difficult to diagnose accurately when non fatal.

The review of sepsis related morbidity was an eye opener (Table VII). While sepsis contributed to only

Table-I. Primary obstetric cause of SAMM and mortality					
		Total number of deliveries: 15757 in the two year period		Total number of SAMM: 110	
		Incidence of SAMM: 6.98/1000 births		Total number of maternal deaths: 11	
Primary disease	SAMM (110)		Maternal death (11)		p
	No	%	N	%	
Hypertension	36	32	04	36.7	0.81
Haemorrhage	32	29	01	09	0.16
Anemia	16	14			
Sepsis	12	10	04	36.7	0.01
Ectopic pregnancy	04	3.6			
Amniotic fluid embolism			02	18.1	
Idiopathic thrombocytopenic purpura	04	3.6			
Uterine rupture	02	1.8			
Diabetic ketoacidosis	01	0.9			
Epilepsy	01	0.9			
Thyrotoxicosis	01	0.9			
Hereditary thrombophilia	01	0.9			

*Values have been rounded off*

Table-II. Comparison of patient profile.			
	SAMM	Maternal death	p
Number	110	11	-
Mean age	29	30.2	NS
Median parity	02	03	NS
Percentage of unbooked	35.4	54	0.21 (NS)

10.6% of morbidity it resulted in 30% of overall mortality. Although it is an avoidable complication these cases required intensive care admission. Compared to survivors non-survivors had higher number of median organ failures, were in septic shock and required

Table-III. Primary obstetric complication in hypertension. Overall mortality index 10%			
	SAMM (n=36)	Mortality (n=4)	Mortality index %
HELLP syndrome	08	02	20
Eclampsia	08	01	11
Severe proteinuric hypertension	15	-	-
Pulmonary edema	04	-	-
Intracranial hemorrhage	01	01	50

mechanical ventilation. Foreign body insertion into the uterus was notorious for causing grave complication. This was noted in two cases of demise.

**Table-IV. Organ system dysfunction in cases of hypertension**

Organ system dysfunction	SAMM (n=36)	Mortality (n=4)	Mortality index %
Respiratory	06	04	40
Cardiac	04	02	33
Renal	08	02	20
Liver	10	02	16
Cerebral	07	04	36
Hematological	12	04	25
Multiple organ dysfunction	06	04	40

**Table-V. Cases of SAMM and mortality with hemorrhage  
Total no. With SAMM 32  
Maternal demise 1 (Major placenta previa with accreta)  
Maternal mortality index 3%**

Disease	Number	%
Abruption placentae	10	31
Uterine atony	09	29
Placenta accreta / praevia	13	40
Multiple fibroids	01	3.1
Cervical tear / vaginal	01	3.1

**Table-VI. Operative interventions in haemorrhage (n=32)  
Obstetric hysterectomy 0.57/1000 births for haemorrhage\***

Operations	Number	%age
Obstetric hysterectomy	09	28
Internal iliac artery ligation	05	15.6
Uterine packing	03	9.4

*\*2 more hysterectomies in this period make overall rate 0.68/1000 births (one each for uterine rupture and HELLP syndrome)*

**Table-VII. Features of cases of sepsis  
Mortality: 4 all septic induced abortions**

Organ / event involved	SAMM (n=12)	Mortality (n=4)	Mortality index %
Septicemia	10	04	28
Mechanical ventilation	08	04	40
Renal dysfunction	09	04	
Liver dysfunction	09	04	30
Haematological dysfunction	08	04	33
Hysterectomy	01	01	50
Colpotomy/laparotomy for pus drainage	02	01	33
ARDS	01	03	75
Multiple organ dysfunction	06	04	40

**Table-VIII. Comparison of incidence of occurrence of acute event at home in cases of SAMM and morbidity and mortality**

Primary cause (total)	SAMM Total at home	Mortality index	Maternal demise Total at home %				
Haemorrhage	32	12	33	01	-	-	03
Hypertension	36	11	36	04	03	75%	10
Sepsis	12	12	100	04	04	100	25

Table VIII shows the comparative analyses of leading causes of SAMM and maternal demise when the acute event occurred at home. Acute event occurring at home leads to increase in both morbidity and mortality.

Therefore the mortality indices are not dramatically high but for sepsis is still the highest 25% for event occurring at home.

There is great heterogeneity and mix up seen in our study. Once the patient was admitted the standard of care was reasonable and hospital offers free facilities so the poor socioeconomic status did not matter any more. But some cases were unbooked or reported late following unsafe abortions thus leading to unfortunate elevation in rates of maternal demise.

## DISCUSSION

A review of SAMM and maternal mortality allows for early detection in trends and health strategies. The incidence of SAMM or 'near miss' in our study is 6.98/1000 deliveries. International literature shows wide variation for example in Ireland 1.05/1000<sup>5</sup> and 5.25/1000 in South Africa<sup>6</sup>. Our rate is closer to the latter though we chose a strict criteria for inclusion as MH is a central referral hospital. While many studies on SAMM have been retrospective<sup>7,8,9</sup> our study is prospective and therefore less open to bias as poor documentation may lead to omission of certain cases. Nearly 10 times as many cases of SAMM are encountered as compared to maternal mortality in the present study.

The near miss to death ratio overall is 10.1:1 in the current study which is less than 15:1 coated by Fielepi et al 10 for a multicentric study that includes both developing and developed centres in South Africa. A very impressive rate of 118:1 has been shown in a UK study<sup>9</sup>. We also tried to assess if near miss events occurred at home or upon arrival in the hospital. In 63% of the cases the event occurred at home in the maternal demise group versus 38% in the SAMM group. As expected there are significantly more women who did not have any antenatal care in the mortality arm. In both cases of eclampsia this is a causative factor and also in all cases of septic abortions who died.

Many studies including Weeks et al<sup>11</sup> in Uganda and Pattenson et al<sup>12</sup> in South Africa have reported on assessment of quality of care in near miss. Our study has not aimed to address this issue. Some studies address only single category of adverse events like post partum haemorrhage by Lu et al in California and Cameron et al<sup>9</sup> in Australia. A study from Netherland<sup>13</sup> used intensive care admission as a single near miss category. We have

recorded all major obstetric categories with special reference to those of obstetric interest like Filipi<sup>10</sup> et al and Wen et al<sup>2</sup>.

Hypertension is the only category with some correlation between mortality/morbidity otherwise there is a stark difference in the ranking of obstetric factors when comparing SAMM with mortality. The mortality in hypertension occurred in HELLP syndrome and two cases of eclampsia. Statistically speaking hemodynamic and respiratory dysfunction are the most common of the complications especially in mortal cases. Multiple organ involvement is a strong predictor of admission to intensive care as in the study by Panday et al<sup>16</sup>.

Though haemorrhage featured as number 2 in ranking as a cause of SAMM very close to hypertension (29% versus 32%) there is only one maternal mortality making mortality index to be low 3%. This is not surprising as MH being a tertiary care hospital is in very close proximity to AFIT and blood and blood products are freely available for timely management of haemorrhage. The overall obstetric hysterectomy rate is 0.68/1000 in our study. This is slightly higher than that coated by Eniola et al<sup>14</sup> from UK. The authors highlight the significant morbidity experienced by women who have undergone obstetric hysterectomy with poor health measurable 6 months later. Our obstetric hysterectomy is double that of study from Netherland where it is 0.33/1000 births<sup>15</sup>. Obstetric hysterectomy is very suitable as a marker of severe morbidity.

The saddest part of the review is sepsis where mortality index is 25%, the highest in the study. These cases greatly spoiled and elevated our mortality data. Unfortunately all 4 cases were performed at home by unskilled attendants. In two cases foreign body was found -match sticks and intrauterine contraceptive device. Once multiorgan failure occurs with septic shock prognosis is very poor despite intensive care. It is sad to note that all these could have been prevented by family planning. The cases of SAMM in this group had longest stay in intensive care.

A very high percentage of patients in SAMM had caesarean sections in haemorrhage and hypertension group compared to background rate of 35%. It could be

because caesarean section carries significant risks or because high risk conditions culminate in caesarean sections. Our findings support the results of Waterstone et al in a UK study<sup>9</sup>. Reopening of patient eg for obstetric hysterectomy following caesarean section or internal iliac artery ligation following obstetric hysterectomy is linked to severe morbidity.

Majority of cases of obstetric hysterectomy are those with previous caesarean section providing a robust evidence of morbidity experienced by these women and making a cogent argument against high caesarean section rate.

Many studies have included transfer to intensive care unit as a measure of SAMM. Not surprisingly the conditions that require intensive care tend to mirror the cause of maternal deaths in most studies. We have not chosen this criterion as in our hospital some patients are managed in high dependency area of labour ward and others in various intensive cares including those adjacent to theatre, on our floor and specialized medical intensive care.

There is now every reason to use a combination of SAMM and maternal deaths to assess the quality and pattern of critical care in obstetrics. Both complement each other as there is a wide difference in ranking of obstetric disease between the two. SAMM: mortality ratio is a new indicator of maternal care. Inclusion criteria should be clearly defined and standardized, so comparisons between different centers could be more meaningful. Not only is SAMM measurable but can be measured very quickly in a single institution to give more meaningful results about resource implications. The experience in countries like Sweden, Sri Lanka, and Malaysia that were traditionally more successful in reducing maternal mortality is a source of insight into successful strategies<sup>16</sup>. In our study the Maternal Mortality Ratio (MMR) in a tertiary care hospital is 69/100,000. The national most recent population based data shows that maternal mortality for Pakistan is 276/100,000 though previously higher rates have been coated<sup>17</sup>. Gathering of information on birth, death, and SAMM even in low resource countries can provide necessary evidence of effectiveness for planners to then

implement successful programmes.

Comparison of incidence of occurrence of acute event at home in cases of SAMM and morbidity and mortality

To conclude there are major differences in the ranking of underlying pathology when comparing SAMM and maternal mortality. Women with SAMM have a higher preponderance of conditions that were amenable to successful intervention like postpartum haemorrhage. Conditions like hypertension featured prominently in both while sepsis is preponderant in the mortality group. By measuring the mortality index in each case a clear picture is provided regarding success or failure in managing life threatening emergencies. Diverse approaches to identify SAMM have been used internationally. Near miss audit provides a means of monitoring the quality of services and is a resource for professional learning.

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## REFERENCES

1. Department of Health; Welch office; **Scottish Home and Health department; Department of Health and Social services, Northern Ireland.** Report on confidential inquiries into maternal death in UK 1991-1993 London: HMSO;1996.
2. Wen SW ,Ling H , Liston R , et al. **Severe maternal morbidity in Canada, 1991-2001.** CMAG 2005;173:1-6.
3. **The Maternal Mortality – way forward.** Patel N,editor. London:Chameleon Press,1992:7-8.
4. Pattison R.C, Buchman E ,Mantel G , Schoon M , Rees H . **Can enquiries into severe acute maternal morbidity act as a surrogate for maternal death inquiries ?** Br J Obstet Gynaecol 2003; 110 : 889-893.
5. MantelGD , Buchmann E ,REES H,Pattinson RC. **Severe acute maternal morbidity: a pilot study of a definition of near miss.** BrJ Obstet Gynaecol 1998;105:985-900.
6. National Committee for Confidential Enquires into Maternal Deaths. **Saving mothers: Confidential Enquiries into maternal deaths in South Africa.** 1998. Department of health.Pretoria: Government Printer, 1999.
7. Cameron CA , Roberts CL , Olive EC, etal. **Trends in post partum haemorrhage .** Aus N Z J Public health

- 2006;30:151-156.
8. Sheikh L , Zuberi NF , Riaz R , Rizvi JH , **Massive post partum haemorrhage: Setting up standards of care.** J Pak Med Assoc 2006;56:26-31.
  9. Waterstone M, Bewely S, Wolfe C. **Incidence and predictors of severe obstetric morbidity: case control study.** BMJ 2001;322:1089-1094.
  10. Fillipi V, Ronsman C, Gohou V , et al. **Maternity wards or emergency obstetric rooms? Incidence of near miss ebents in African hospitals.** ActaObstetric Gynaecol Scand 2006;84:11-16.
  11. Weeks A ,Lavender T , Nazziwa E , Mirembe FM . **Personal accounts of near miss maternal mortalities in Kampala, Uganda.** BJOG 2005;112: 1302 -1307.
  12. Pattinson RC , Say L, Makin JD , Bastos MH. **Critical incident audit and feedback to improve perinatal and maternal mortality and morbidity.** Cochrane Database Syst Rev 2006;(4):CD002961.
  13. Keizer JL, Zwart JJ, Meerman RH, et al. **Obstetric intensive care admissions: a 12 year review in a tertiary care centre.** Eur J Obstet Gynecol Reprod Biol 2006 ;128:152-156.
  14. Eniola OA , Bewely S , Waterstone M, et al. **Obstetric hysterectomy in a population of South east England.** J Obstet Gynecol2006;26:104-109.
  15. Kwee A , Bots ML , Visser GH , Bruinse HW. **Emergency peripartum hysterectomy: a prospective study in Netherlands.** Eur J Gynaecol Oncol 2006;124:187-192.
  16. Levine R. **Millions saved: proven success in global health.** Centre for global health. Center for Global Development Brief 2004;3(3) (October). Available: <http://www.cgdev.org/Publications/index.cfem>.
  17. National Institute of Population Studies (NIPS) [Pakistan] and Macro International. 2008. Pakistan Demographic and Health Survey 2006-07: Key Findings. Calverton, Maryland, USA: NIPS and Macro International.

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If you don't risk  
anything you risk even more.

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